

What is claimed is:

- 1 1. Computer executable software and device for guiding brain activity training
2 comprising:
3 logic which takes data corresponding to activity measurements of one or more internal
4 voxels of a brain and determines one or more members of the group consisting of: a) what
5 next stimulus to communicate to the subject, b) what next behavior to instruct the subject to
6 perform, c) when a subject is to be exposed to a next stimulus, d) when the subject is to
7 perform a next behavior, e) one or more activity metrics computed from the measured
8 activity, f) a spatial pattern computed from the measured activity, g) a location of a region of
9 interest computed from the measured activity, h) performance targets that a subject is to
10 achieve computed from the measured activity, i) a performance measure of a subject's success
11 computed from the measured activity, j) a subject's position relative to an activity
12 measurement instrument; and
13 logic for communicating information based on the determinations to the subject in
14 substantially real time relative to when the activity is measured.
- 1 2. The software and device according to claim 1 wherein measuring brain
2 activity is performed by fMRI.
- 1 3. The software and device according to claim 1 wherein the determinations are
2 made in less than 10 seconds relative to when the activity is measured.
- 1 4. The software and device according to claim 1 wherein the determinations are
2 made in less than 1 second relative to when the activity is measured.
- 1 5. The software and device according to claim 1 wherein the determinations are
2 made in less than 0.5 second relative to when the activity is measured.
- 1 6. The software and device according to claim 1 wherein the information is
2 determined while the instrument used for measurement remains positioned about the subject.
- 1 7. The software and device according to claim 1 wherein the activity

2 measurements are made using a device capable of taking measurements from one or more
3 internal voxels without substantial contamination of the measurements by activity from
4 regions intervening between the internal voxels being measured and where the measurement
5 apparatus collects the data.

1 8. The software and device according to claim 1 wherein measurements are made
2 from at least 100 separate internal voxels, and these measurements are made at a rate of at
3 least once every five seconds.

1 9. The software and device according to claim 1 wherein measurements are made
2 from a set of separate internal voxels corresponding to a scan volume including the entire
3 brain.

1 10. The software and device according to claim 1 wherein the size of the internal
2 voxels have a total three dimensional volume of 5x5x5cm or less.

1 11. The software and device according to claim 1 wherein the size of the internal
2 voxels have a total three dimensional volume of 1x1x1cm or less.

1 12. The software and device according to claim 1 wherein the software further
2 comprises logic for selecting one or more of the internal voxels to correspond to a region of
3 interest for the subject and using the selected internal voxels of the region of interest to make
4 the one or more determinations.

1 13. The software and device according to claim 1 wherein the information is
2 communicated by a manner selected from the group consisting of providing audio to the
3 subject, providing tactile stimuli to the subject, providing a smell to the subject, displaying an
4 image to the subject.

1 14. The software and device according to claim 1 wherein the information
2 communicated is an instruction to the subject.

1 15. The software and device according to claim 14 wherein the instruction is a text
2 or iconic indication denoting an action that a subject is to perform.

1 16. The software and device according to claim 14 wherein the instruction
2 identifies a task to be performed by the subject.

1 17. The software and device according to claim 14 wherein the instruction is
2 determined by computer executable logic.

1 18. The software and device according to claim 17 wherein the instruction
2 communicated is selected from a set of instructions stored in memory, the selection being
3 based upon the brain activity measured.

1 19. The software and device according to claim 1 wherein some of the information
2 communicated to the subject is material to be learned.

20. A method comprising:

(a) measuring activity of one or more internal voxels of a brain;

(b) communicating instructions to a subject derived from that measured activity in
substantially real time relative to when the behavior is performed; and

(c) having the subject perform a behavior in response to receiving the instructions.

21. A method according to claim 20 wherein measuring brain activity is
performed by fMRI.

1 22. A method according to claim 20 wherein measurements are made from at least
2 100 separate voxels.

1 23. A method according to claim 20 wherein the instructions are derived through a
2 computer executable logic process of selecting from a set of possible instructions based upon
3 the brain activity measured.

1 24. A computer assisted method comprising:

2 measuring activity of one or more interior volumes of a brain;

3 employing computer executable logic that takes the measured brain activity and
4 determines information to communicate to the subject; and

5 communicating the determined information to the subject;

6 wherein the determined information is communicated to the subject in substantially
7 real time relative to when the activity is measured.

1 25. A method according to claim 24, wherein computer executable logic is
2 employed to cause the information to be communicated to the subject.

1 26. Computer executable software, the software comprising:
2 logic for taking activity measurements of one or more localized brain regions as a
3 behavior is performed; and
4 logic for communicating information to the subject based on the measured brain
5 activity in substantially real time relative to when the behavior is performed;
6 wherein the logic takes new activity measurements as they are received and communicates
7 new information based on the new activity measurements.

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